B. Schneider Electric

1. **MERLIN GERIN:**
   ELECTRICAL DISTRIBUTION

   a. Case circuit breakers

   b. Air circuit breakers and switches
      - Masterpact 800 to 6300A
      - Masterpact DC range
      - Interpact 40 to 2500A

   c. Residual current

   d. Signaling measurement

   e. Continuous insulation monitoring

an international reference

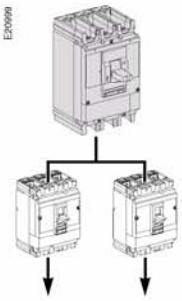
Compact NS circuit breaker
1 terminals
2 cover
3 toggle and position indicator
4 push-to-trip button
5 trip unit
6 test kit connector

With the Compact system, Merlin Gerin is today Europe's leading manufacturer of moulded-case circuit breakers.
The Compact range covers all ratings from 15 to 1250 A:
- Compact NS, from 15 to 630 A;
- Compact C, from 800 to 1250 A.

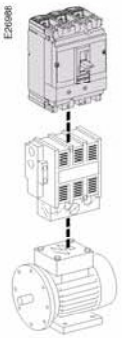
A number of versions:
- 1, 2, 3 or 4 poles;
- fixed, plug-in or withdrawable;
- a comprehensive range of trip units.

Circuit breakers designed for all applications:
- 1000 V AC models;
- models for DC systems;
- source changeover systems.

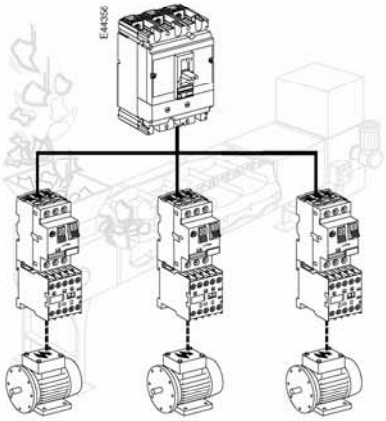
applications



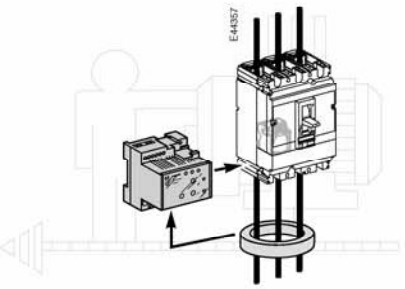
■ **protection of low-voltage distribution networks**
□ installation in power distribution switchboards
□ installation on symmetrical rails



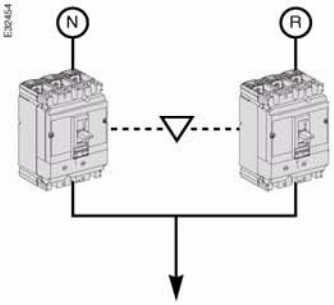
■ **protection of motor starters**



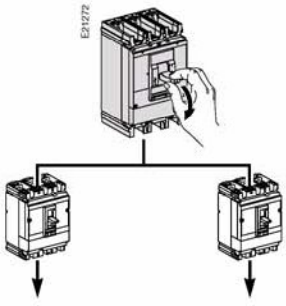
■ **protection of incoming devices of industrial control panel**



■ **earth fault protection**



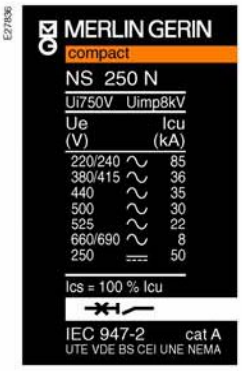
■ **source changeover**

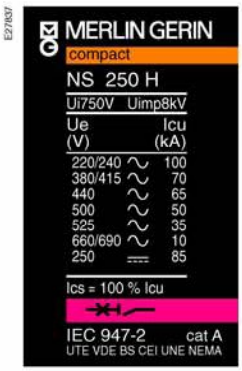


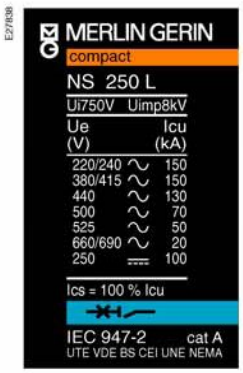
■ **switch-disconnectors**

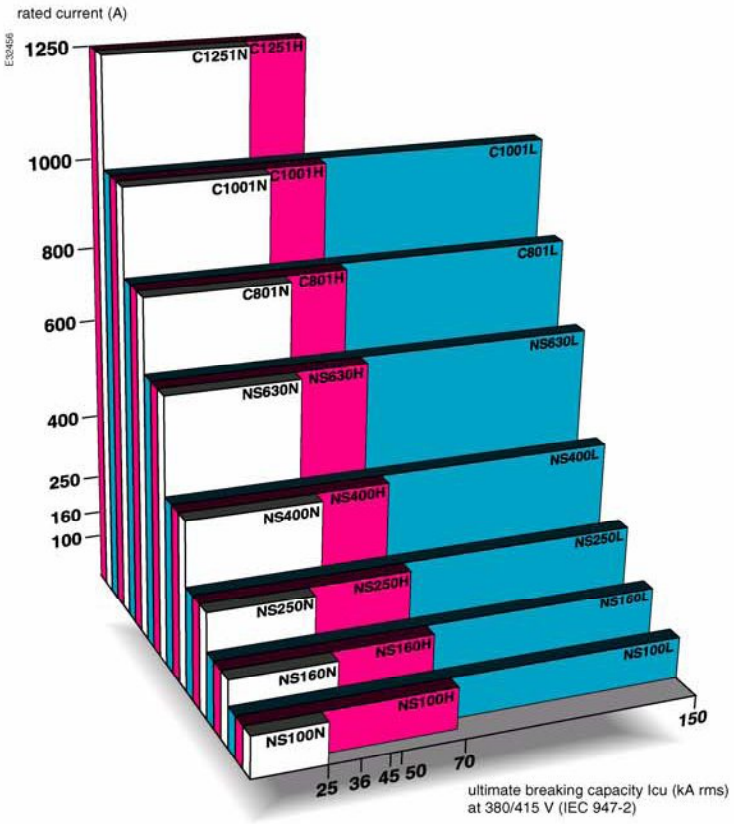
ratings and breaking capacities

The rating plates on the front face of the circuit breakers indicate the breaking capacity:
N: normal
H: high
L: very high.

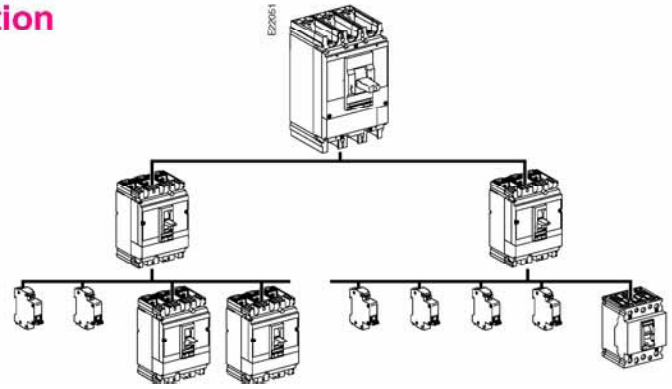






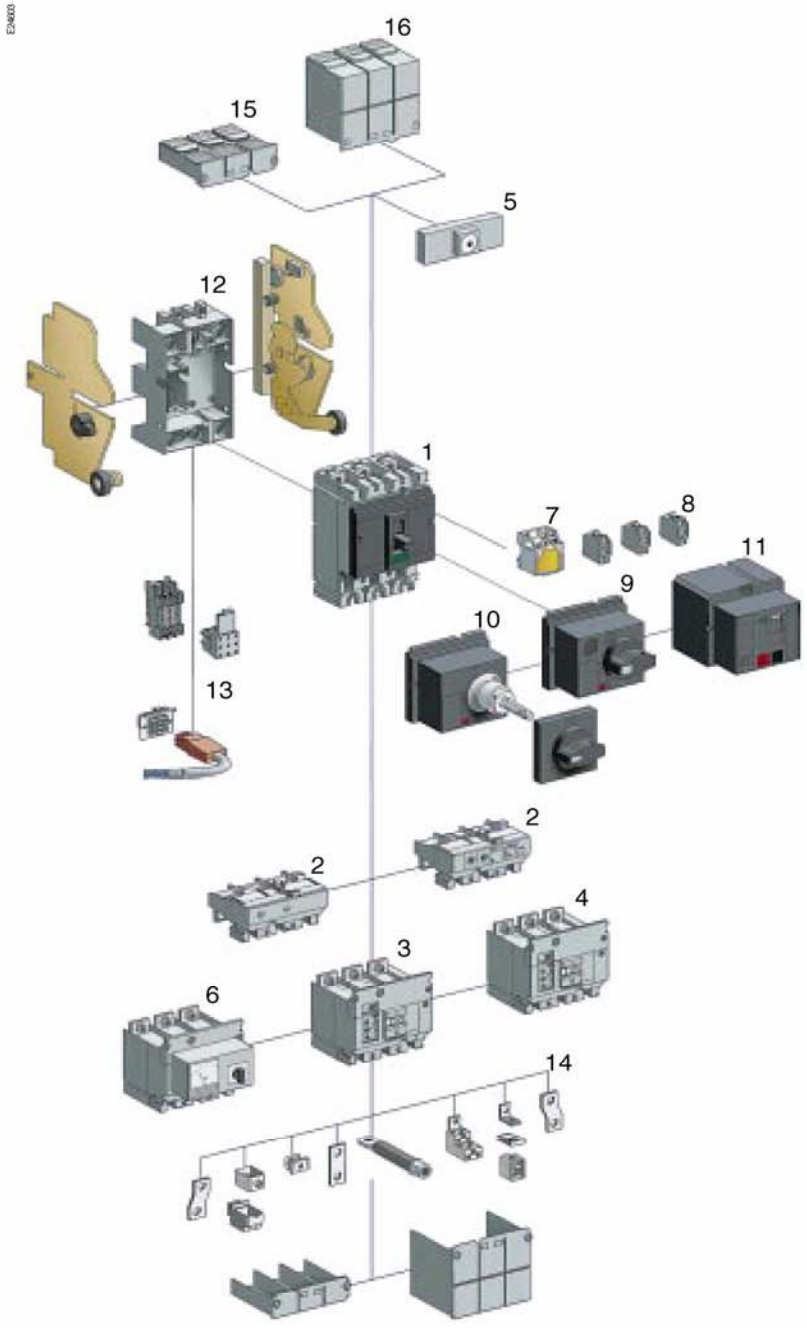


discrimination



Even when equipped with standard trip units, Compact circuit breakers offer the best guarantee of electrical power availability when faults occur. In most cases, discrimination between protective devices is ensured for all types of faults (overloads, low and high short-circuit currents).

modular system



System of add-on modules for Compact NS100N/H/L to NS250N/H/L.

A wider range of add-on modules makes it possible to adapt the Compact system to a maximum number of configurations.
Trip units, auxiliaries and installation and connection accessories are the same for all models within each of following ranges:
- Compact NS80 and NSA125/160
- Compact NS100 to NS250,
- Compact NS400 to NS630,
- Compact C801 to C1251.

The common modules for Compact NS100 to NS250 circuit breakers and switch-disconnectors are shown opposite.
The same principle applies to Compact NS400 to NS630 and Compact C801 to C1251 circuit breakers.
Fewer catalogue numbers means immediate availability of parts for all solutions.

1. Breaking unit.
2. Trip unit.
3. Vigi earth-fault protection module.
4. Insulation monitoring module.
5. Voltage presence indicator.
6. Ammeter.
7. Voltage releases MN or MX.
8. Multifunction auxiliary switch.
9. Direct rotary handle.
10. Extended rotary handle.
11. Motor mechanism.
12. Plug-in base.
13. Connection of plug-in and withdrawable configuration auxiliary circuits.
14. Connection accessories.
15. Short terminal shields.
16. Long terminal shields.

simplified installation

Compact circuit breakers make it possible to standardise switchboards, meaning faster installation and fewer errors.
All type L Compact circuit breakers (150 kA) are housed in the same frame as the type N and type H models with the same ratings.

Compact circuit breakers can be easily installed side-by-side in a minimum amount of space.

4 sizes from 80 to 1250 A

Compact 80 A | 100 to 250 A | 400 to 630 A | 800 to 1250 A

connection

Connection parts for Compact NS.

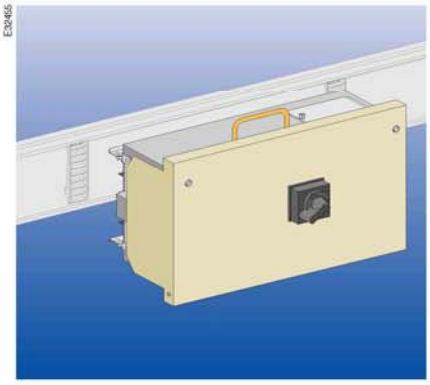
Numerous connection possibilities, including front and rear connections for bare cables, cable lugs or bars, as well as plug-in or withdrawable versions, are available using a full set of accessories that can be rapidly added to the circuit breaker.

plug-in and withdrawable versions

Withdrawable Compact NS250N on a chassis.

Plug-in and withdrawable versions for:
- fast removal or insertion of the circuit breaker without exposure to live parts;
- standby outgoing circuits ready for wiring and circuit breaker installation at a later date;
- for visible break disconnection.

prefabricated trunking



Compact NS circuit breakers can be installed in junction boxes of the Telemecanique Canalis range of prefabricated trunking (see corresponding catalogue).

interchangeable trip units

Each Compact device provides different types of protection depending on the associated trip unit:
- standard protection,
- protection of networks supplied by generators,
- protection of long cables,
- protection of DC networks,
- protection of motor-starters,
- service connection circuit breaker (for special subscriber contracts).

Compact NS100... 630

Compact NS250H.

Thermal-magnetic trip unit TM.

Electronic trip unit STR22SE.

On Compact NS100 to NS250 circuit breakers, the thermal-magnetic and electronic trip units are interchangeable and may be rapidly fitted to the circuit breakers. It is therefore easy to change the protection of a given circuit following a modification in an installation.
On Compact NS400 and NS630 circuit breakers, the electronic trip units are interchangeable plug-in modules.
Trip unit STR53UE offers a large number of protection settings.

Compact C801... 1251

Compact C1251H circuit breaker.

Electronic trip unit STR35SE.

Electronic trip units allow perfect adaptation of the protection to each circuit in the electrical distribution network, and, at the same time, simplify the selection, installation and operation of the devices:
- wider range of settings, so that a single trip unit can provide several types of protection,
- easier checking during assembly or on site,
- new functions offered by the trip unit, such as load monitoring and local indications.

other functions

indication and measurement

Compact NS250L with ammeter module.

Four indication and measurement functions may be mounted directly on Compact NS circuit breakers:
- voltage presence indicator for the circuit breaker terminals, particularly useful on switchboard incoming units,
- display of current readings,
- remote transmission of current readings,
- earth fault indication for earth fault detection on TNS systems or assistance in locating earth faults on TT systems.

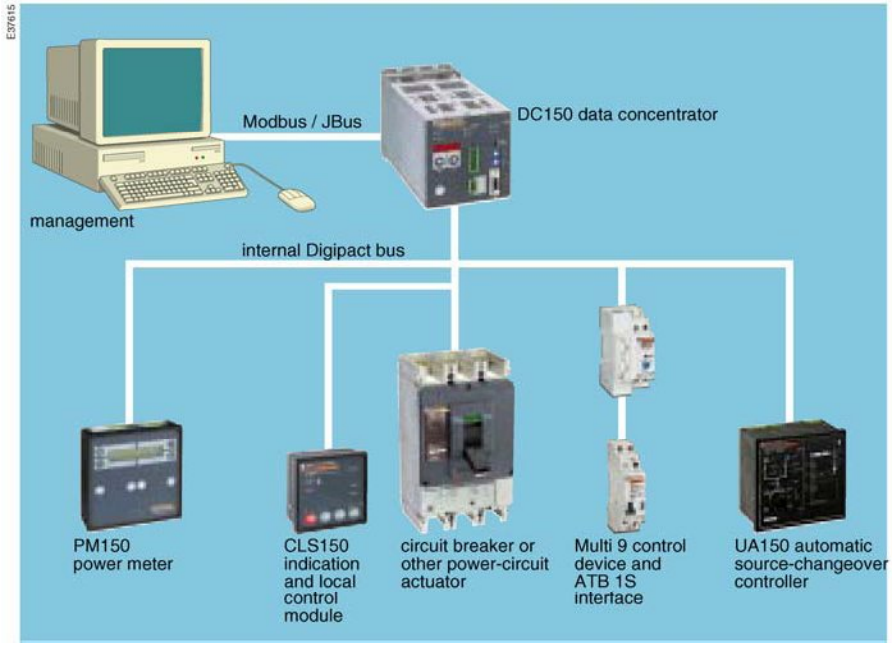
options for trip unit STR53UE

Compact NS trip unit STR53UE.

On Compact NS400/630 circuit breakers, trip unit STR53UE offers:
- specific indications for different faults (overloads, short-circuits, etc.),

... and a number of optional functions:
- built-in ammeter;
- earth-fault protection;
- zone selective interlocking;
- transmission of all information concerning circuit-breaker operation to a monitoring, control or automated distribution centre, via Dialpact modules (see below).

Digipact: electrical installation management



Compact circuit breakers incorporate or may be equipped with Digipact communications modules. From a remote location (standard personal computer PC or programmable logic controller PLC), the operator can:
- display the status of circuit breakers;
- control the circuit breakers;
- access information provided by the electronic trip units.

It is also possible to check the status of the UA150 automatic source-changeover controllers.
For more information: see Digipact catalogue.

common accessories

electrical auxiliaries

Auxiliary switch and MX release for Compact NS.

■ auxiliary switches:
□ Compact NS: just one model, the same for all Compact NS80 to NS630 and NSA125/160 circuit breakers, provides four different functions (OF, SD, SDE and SDV) depending on where it is fitted in the circuit breaker,
□ Compact C: two models, the same for all Compact C801 to C1251 circuit breakers, provide remote indications of circuit breaker status and electrical faults (e.g. 30F + 1SD),
■ the MN or MX voltage releases are common for all models within each of following ranges:
□ NS80 and NSA125/160,
□ NS100 to NS630,
□ C801 to C1251.
■ auxiliary switches for Compact NS are also available in communicating version and can be installed in place of the standard switches (see Digipact catalogue).

motor mechanism

Compact NS250N with motor mechanism.

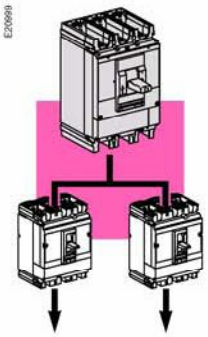
A motor mechanism can be fitted to the front face of Compact NS100 to C1251 circuit breakers. Remote control of the opening, closing and reset functions is then possible via 2 or 3 impulse or maintained signals.
If necessary, the circuit breakers can still be operated locally via the controls on the front face.
The motor mechanism modules for each range have a common size.
The motor mechanism module for Compact NS is also available in communicating version (see Digipact catalogue).

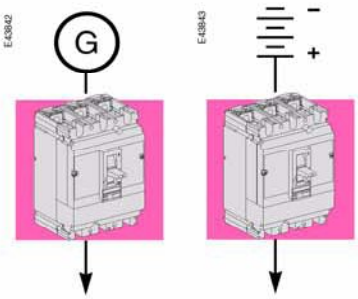
Vigi earth-fault protection module

Compact NS250H with Vigi earth-fault protection module.

Vigi modules can be added to Compact NS circuit breakers to provide earth-fault protection. The Vigi modules fit directly on the circuit breaker terminals.
The addition of a Vigi module has no effect on the other performance characteristics of the circuit breaker.

circuit breakers for protection of low voltage distribution networks





rated current (A)		12.5 … 100	12.5 … 160	12.5 … 250	60… 400	250… 630	320… 800	400… 1000	500… 1250
									
Compact Vigicompact		**NS100**	**NS160**	**NS250**	**NS400**	**NS630**	**C801**	**C1001**	**C1251**
breaking capacity (kA rms) 380/415 V	N	25	36	36	45	45	50	50	50
	H	70	70	70	70	70	70	70	70
	L	150	150	150	150	150	150	150	

for AC networks up to 1000 V :

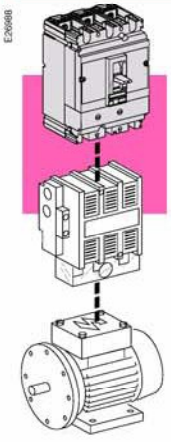
Compact NS400 N 1000 V
Compact C1251N 1000 V

protection

The interchangeable thermal-magnetic or electronic trip units of the Compact NS are designed to protect the following types of electrical installations:

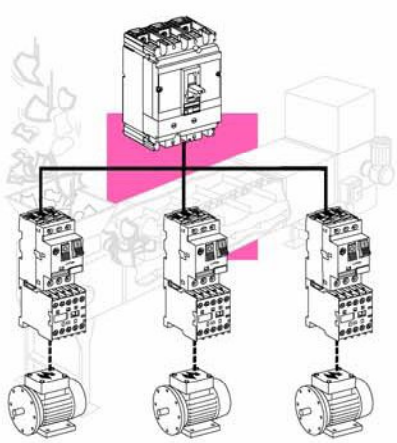
- Standard installation (supplied by a transformer);
- Installations supplied by a generator;
- DC installations;
- Long cable lengths for IT and TN;
- Motors and motor starters.

circuit breakers for motor protection



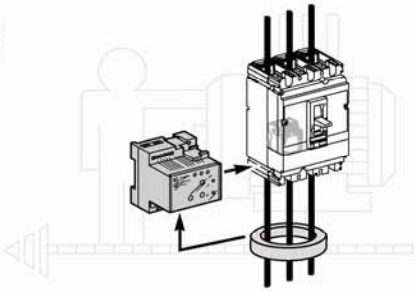
motor rating power (kW)		0.37 … 37	1.1 … 220	110…250	160…670
					
Compact		**NS80**	**NS100/160/250**	**NS400/630**	**C801/C1001/C1251**
breaking capacity (kA rms) 380/415 V	N		25/36		50
	H	70	70	70	70
	L		150	150	

circuit breakers for protection of industrial control panels



rated current (A)		12.5 … 100	12.5 … 100	12.5 … 160	12.5 … 250	60… 400	250… 630
							
Compact (CEI947-2 / UL508 / CSA22-2)		**NSC100**	**NS100**	**NS160**	**NS250**	**NS400**	**NS630**
breaking capacity (kA rms) 380/480 V	N	18	25	35	35	42	42
	H		65	65	65	65	65
rated current (A)		**15-100**	**15-250**			**60-600**	
							
Compact (UL 489 / CEI947-2 / CSA22-2)		**NSE100**	**NSF150**	**NSF250**		**NSJ400**	**NSJ600**
breaking capacity (kA rms) 480 V	N	18	35	35		35	35
	H		65	65		65	65
	L					100	100

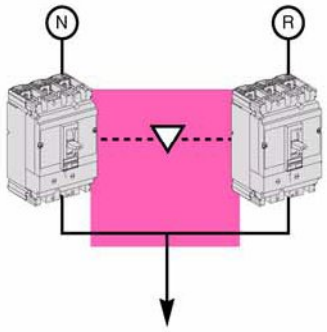
circuit breakers and relays for earth fault protection



rated current (A)		100…630		
				
Compact Vigicompact		NSC100 N	NS100 N/H/L	NS400 N/H/L
			NS160 N/H/L	NS630 N/H/L
			NS250 N/H/L	

Vigirex	**earth fault relays**	**separate toroids**
		
circuit breakers associated	all Compact NS equiped by a voltage release (MN or MX)	

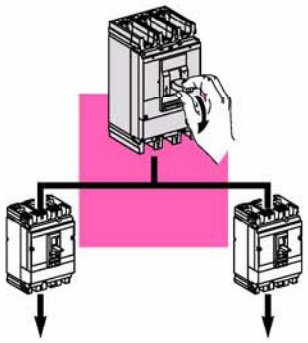
source-changeover



rated current (A)	12.5 … 100	12.5 … 160	12.5 … 250	160… 400	250… 630	320… 800	400… 1000	500… 1250
manual source-changeover system	by toggle							
	by rotary handle							
	by keylock							
automatic source-changeover systems								

Compact	NS100 to NS250	NS400 to NS630	C801 to C1251
	All NS100 to NS250 type N/H/L/NA fixed or plug-in devices.	All NS400 to NS630 type N/H/L/NA fixed or plug-in devices.	All C801 to C1251 type N/H/NI and C801 to C1251 type L fixed devices.

switch-disconnectors



rated current (A)	100…160…250	400…630	800…1250
			
Compact Vigicompact	NSC100NA	NS400NA	C801NI
	NS100NA	NS630NA	C1251NI
	NS160NA		
	NS250NA		

rated current (A)	40…63…80	100…125…160	250…400…630	1000…1600… 2500
				
Interpact	INS40	INS100	IN250	IN1000
	INS63	INS125	IN400	IN1600
	INS80	INS160	IN630	IN2500

rated current (A)	50…63	125…160	250…400	630
				
Fupact switches	UC50	UC125	UD250T	UD630T
	UD63	UD125	UD400T	
		UD160		

1.b. AIR CIRCUIT BREAKERS & SWITCHES

MASTERPACT 800 to 6300 A

Masterpact circuit breakers are used to protect and control low-voltage distribution systems. They may be installed in main LV switchboards (incoming units, main and secondary outgoers). Masterpact is a complete range offering a **large selection of performance levels:**

- ratings from 800 to 6300 A AC, from 1000 to 8000 A DC;
- breaking capacity from 40 to 150 kA rms;
- operational voltages 690 V AC, 1000 V DC.

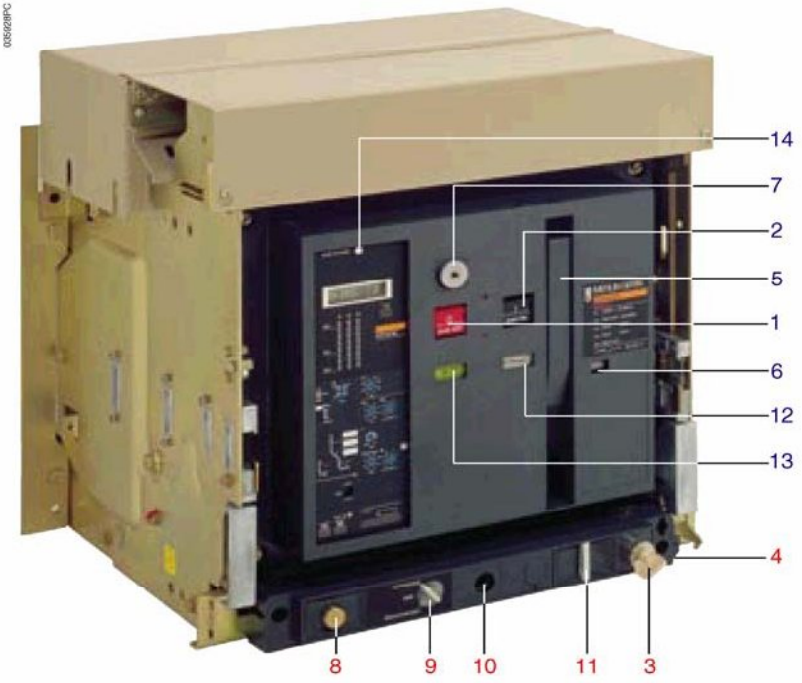
Many versions

- 3 or 4 poles;
- fixed or drawout versions;
- current-limiting version up to 2500 A;
- wide range of control units offering multiple functions.

Circuit breakers designed for all applications

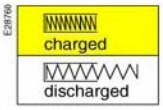
- 1000 V AC version;
- DC version;
- anti-corrosion version;
- source-changeover version;
- merchant-marine and military versions.

Masterpact circuit breakers **comply with all major international standards** and meet T2 tropicalisation criteria.

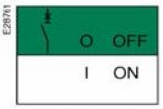


front face

1 opening push-button (O)
2 closing push-button (I)
3 keylock for "connected", "disconnected" or "test" position
4 door interlock
5 stored-energy-mechanism charging handle
6 operations counter
7 "open" position keylock
8 racking handle storage
9 functional position indicator: "connected", "test" and "disconnected"
10 controls on fixed chassis (accessible with cubicle door closed)
11 padlocking facilities for "connected", "disconnected" or "test" position
12 stored-energy-mechanism status indicator
- "charged"
- "discharged"



13 main-contact position indicator
- "OFF" (O);
- "ON" (I).

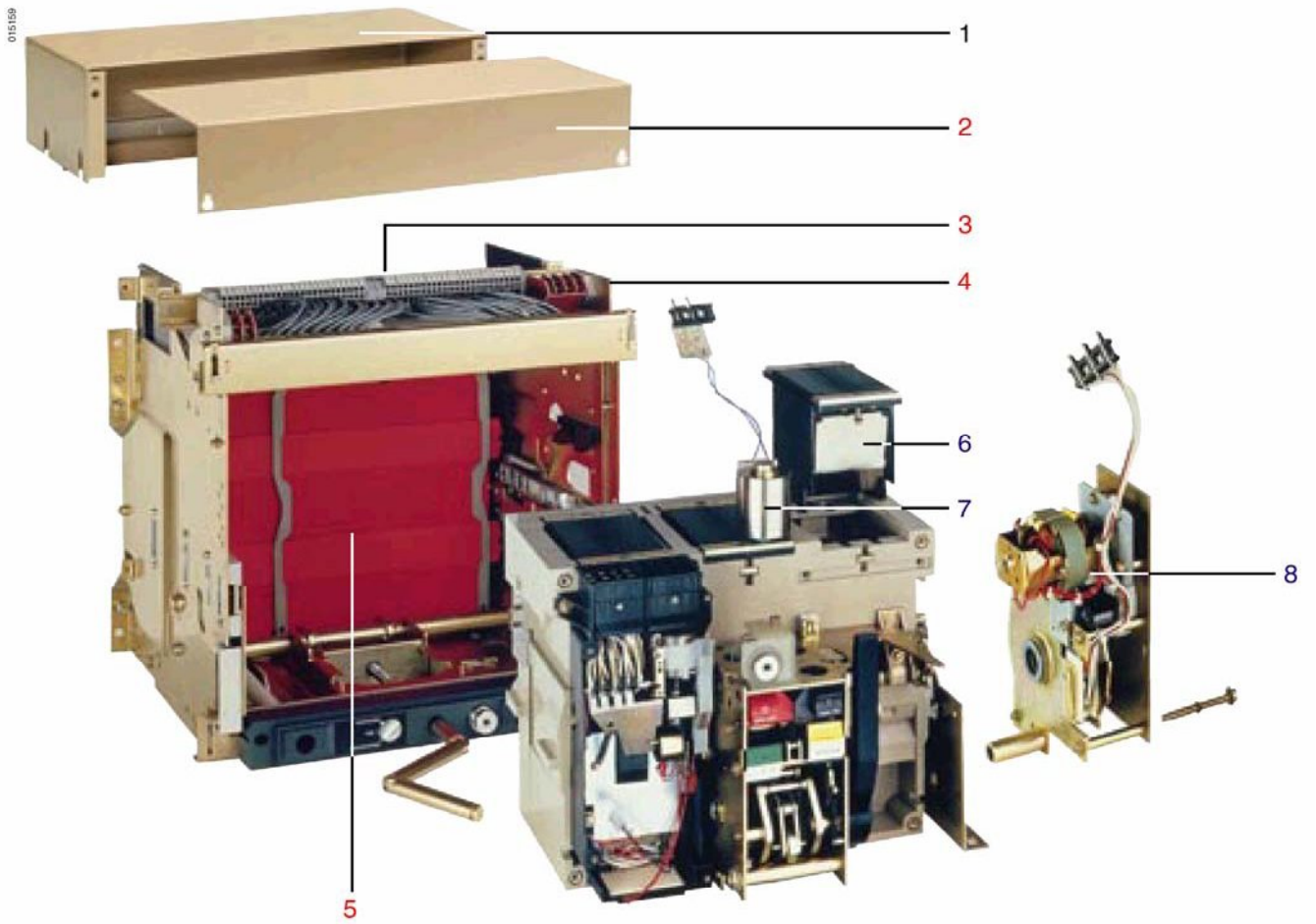


14 fault-trip indicator/breaker reset button
LV circuit-breaker: blue figures
Enclosure: red figures

Reduced dimensions

- AC circuit breakers:
  - a single frame size from 800 to 3200 A,
  - common height and depth from 800 to 6300 A;
- DC circuit breakers:
  - common height and length from 1000 to 8000 A for operational voltages of up to 500 V DC,
  - common height and length from 1000 to 4000 A for operational voltages greater than 500 V DC.

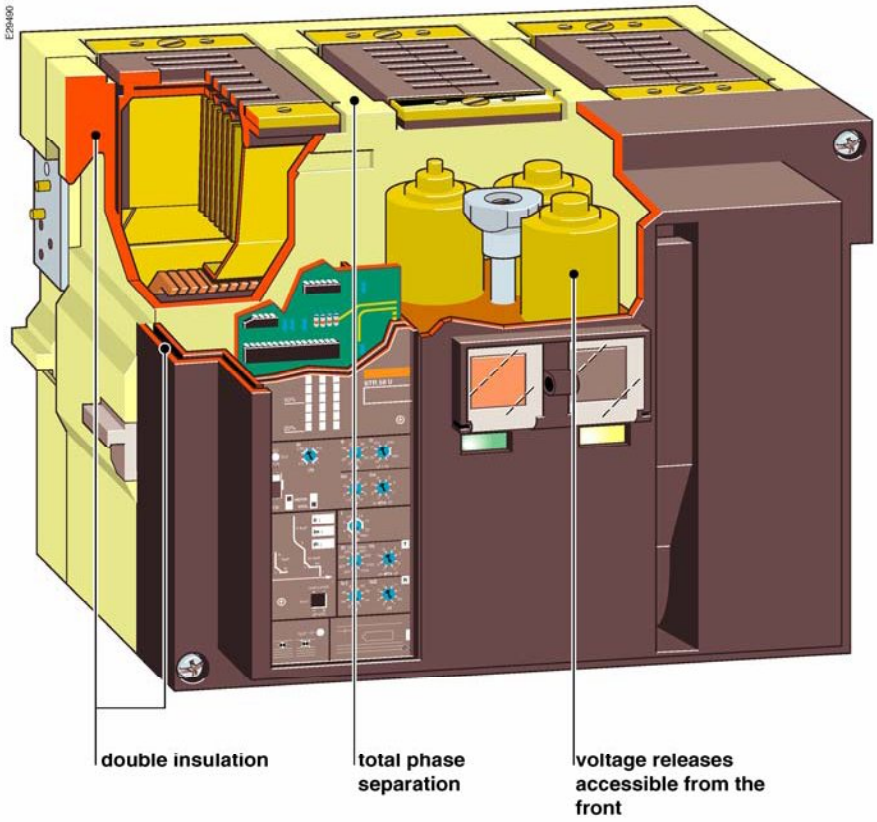
MASTERPACT 800 to 6300 A



drawout version

1	arc chute cover
2	auxiliary terminal shield
3	auxiliaries connection block
4	fixed chassis
5	safety shutters
6	arc chute
7	remote control voltage release
8	motor for electrical charging of stored energy mechanism
9	control unit (AC system)
10	front cover

MASTERPACT 800 to 6300 A



safety and reliability

- reduced, simple maintenance (main contacts easily accessible, with wear indication feature);
- double insulation from the front face;
- positive contact indication;
- auxiliary devices can be fitted on site without adjustment;
- fewer parts than conventional ranges (by a factor of 5-10);
- a trip interlock ensures that the circuit breaker is open during connection and disconnection;
- connection to top or bottom terminals;
- fully tropicalised as standard.

stored energy operating mechanism

Masterpact circuit breakers are operated via a stored energy mechanism for instantaneous opening and closing.
The mechanism is charged either manually or electrically. Closing and opening operations can be initiated either from the local pushbuttons on the circuit breaker front face, or by remote control.

common auxiliaries from 800 A to 6300 A

Auxiliaries

- accessible from the front, mounted in a separate compartment insulated from power circuits;
- secured by a single screw;
- adjustment-free;
- can be fitted on site.

other possibilities

Fixed circuit breaker

Automatic source-changeover controller

■ Fixed circuit breaker
The fixed circuit breaker is derived from the moving part of the drawout circuit breaker by adding a fixing bracket on each side.

■ Switch version
The switch (unprotected) version is derived directly from the standard circuit breaker, but does not implement a control unit (or the magnetic trip units used with the DC circuit breakers). Available models are:
□ standard: type HI and NI;
□ high performance: type HF, equipped with a protection system that instantaneously opens the circuit breaker in the event of closure under fault conditions.

■ Earthing switch
A special short-circuit and earthing switch is available on request for the M08 to M32H drawout types, 3 or 4 poles. Please consult us.

■ 1000 V AC circuit breakers

■ Source changeover system
Four solutions are available:
□ mechanical interlocking for 2 or 3 circuit breakers, adaptable to various source-changeover configurations;
□ automatic source-changeover controller, easy to implement on any two suitably equipped circuit breakers (electrically charged operating mechanism, etc.) (for 3 circuit breakers, consult us);
□ complete assembly including 2 or 3 mechanically (rod assembly) interlocked circuit breakers, adaptable to various source-changeover configurations;
□ complete assembly including 2 mechanically (rod assembly) interlocked circuit breakers and an automatic source-changeover controller, adaptable to various source-changeover configurations. Ready for connection.

MASTERPACT 800 to 6300 A

Fixed Masterpact DC circuit breaker

Drawout Masterpact DC circuit breaker

DC circuit breakers

Masterpact DC circuit breakers are available in fixed and drawout versions. They benefit from the AC range technology and advantages.

- 5 available ratings from 1000 to 8000 A;
- 2 breaking capacities, 100 kA at 500 V, 50 kA at 750 and 1000 V;
- a circuit-breaker version offering instantaneous short-circuit protection with an adjustable, magnetic trip unit (DINA);
- a switch (unprotected) version.

note: up to 125 V DC, the devices in the AC range (M08 to M63) may be used only in the switch version, in which case a three-pole, type HI device should be used, with:

- 1 pole for the positive polarity;
- 1 pole for the negative polarity;
- 1 pole not used.

Auxiliaries

All the auxiliaries designed for the Masterpact AC circuit breakers may be used on the DC versions, with the exception of the position switches, indicating the connected (CE), disconnected (CD) and test (CT) positions.

Auxiliary connections are made via one or two manually disconnectable plugs that remain accessible from the front.

Accessories

Standard Masterpact DC range equipment includes an arc-chute cover (CC) and, on drawout versions, safety shutters (VO). Interphase barriers (EIP) are not available for the DC range.

device identification

M 20 H1

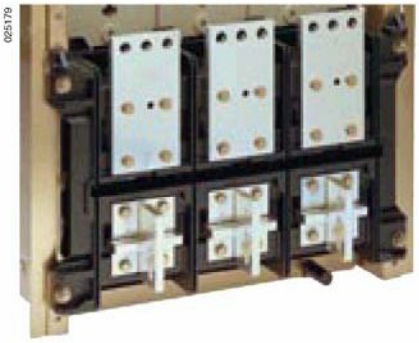
breaking capacity;
- N1: standard;
- H1: H2: high performance;
- L1: current limiting;
- DC: direct current.

rating
- rated current / 100.

family
- Masterpact: LV power air circuit breaker.

MASTERPACT 800 to 6300 A

2500 A Masterpact circuit breaker



Top: front connection
Bottom: rear vertical connection

Masterpact circuit breakers are the product of Merlin Gerin's vast experience in the field of power circuit breakers. They incorporate all the qualities of traditional air circuit breakers while drawing on certain of the advantages specific to moulded-case circuit breakers. In particular, they require no preventive maintenance.

ease of installation

Masterpact is a complete and rationally designed range.

- 10 ratings;
- 4 breaking-capacity levels;
- 6 control units;
- a complete range of auxiliaries and accessories;
- numerous versions (three and four-pole devices, fixed and drawout versions, etc.).

Masterpact circuit breakers are easy to incorporate in switchboards.

- a single frame size from 800 to 3200 A, thus making for standardised columns;
- an upper safety clearance equal to zero due to the arc-chute cover, on both the fixed and drawout versions;
- built-in measurement functions in the control units;
- auxiliaries are the same for the entire range and may be easily implemented (only a screwdriver is required).

Masterpact circuit breakers are easy to connect to the main distribution system.

- all types of connections are available (horizontal and vertical terminals, front and mixed connections);
- connections are possible with bars of any thickness;
- connection to the input power source is possible on the upper or lower terminals of the circuit breakers.

Due to their small size, Masterpact circuit breakers can replace most existing circuit breakers.

continuity of service

Masterpact circuit breakers are designed with continuity of service in mind. The result is:

- total time discrimination on the N1 and H1 circuit breakers and maximum discrimination on H2 circuit breakers;
- factory pre-setting of Masterpact circuit breakers which never require any periodic maintenance;
- high electrical endurance: 10 000 cycles at 1600 A and 30 cycles at 50 kA, without maintenance;
- preventive indications: load-shedding indication switch, long-time threshold overrun alarm, etc.;
- easy access to the main contacts fitted with mechanical wear indicators. An optional function on the STR68 control unit is the remote indication of contact wear, thus making possible continuous monitoring of circuit breakers during their service life.

operating safety

The insulating casing of Masterpact circuit breakers provides for:

- user safety:
  - double insulation on the front face (class II),
  - auxiliary circuits in a compartment insulated from the power circuits;
- switchboard safety when the circuit breaker is in the open position:
  - each pole is effectively isolated in its own housing,
  - limitation of external disturbances.

Positive contact indication

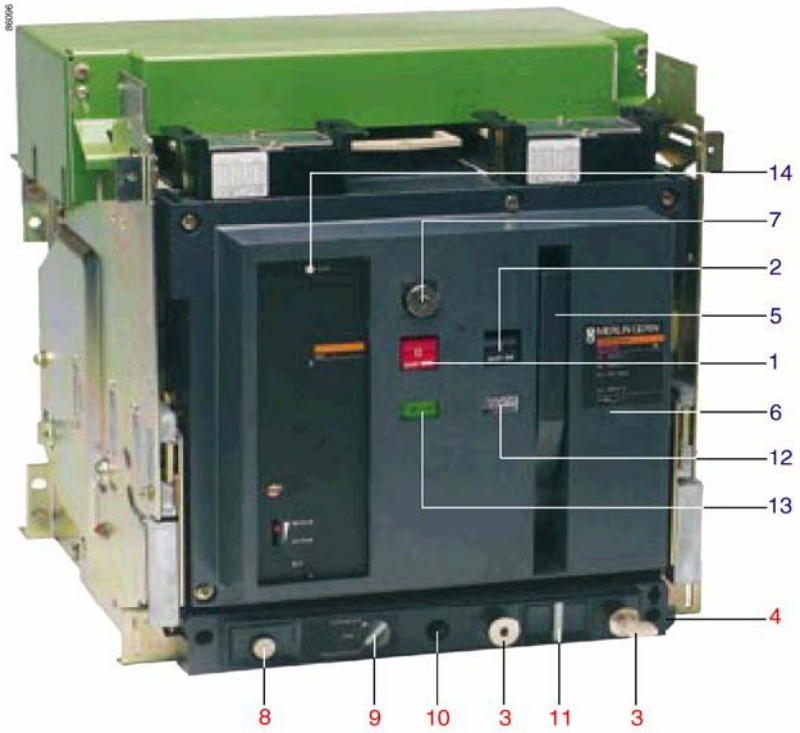
The position indicator cannot indicate «open» unless the poles are effectively separated by the required distance.
The circuit breakers **automatically open during racking in and out**.

reliability

- Masterpact circuit breakers comprise ten times fewer parts than traditional devices. They are easier to produce and more reliable.
- the Masterpact circuit-breaker factory is certified ISO 9002;
- the design of Masterpact circuit breakers is modular with delayed differentiation (highest possible number of common parts on all models). The result is shorter delivery times and enhanced reliability.

MASTERPACT DC RANGE

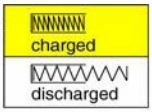
Masterpact circuit breakers are used to protect and control low-voltage distribution systems. They may be installed in main LV switchboards (incoming units, main and secondary outgoers).



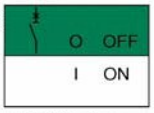
LV circuit-breaker: blue figures
Chassis: red figures

front face

1 opening push-button (O)
2 closing push-button (I)
3 keylock for "connected", "disconnected" or "test" position
4 door interlock
5 stored energy mechanism charging handle
6 operations counter
7 "open" position keylock
8 racking handle storage
9 functional position indicator: "connected", "test" and "disconnected"
10 controls on fixed chassis (accessible with cubicle door closed)
11 padlocking facilities for "connected", "disconnected" or "test" position
12 stored energy mechanism status indicator
- "charged"
- "discharged"



13 main contact position indicator
- "OFF" (O);
- "ON" (I).



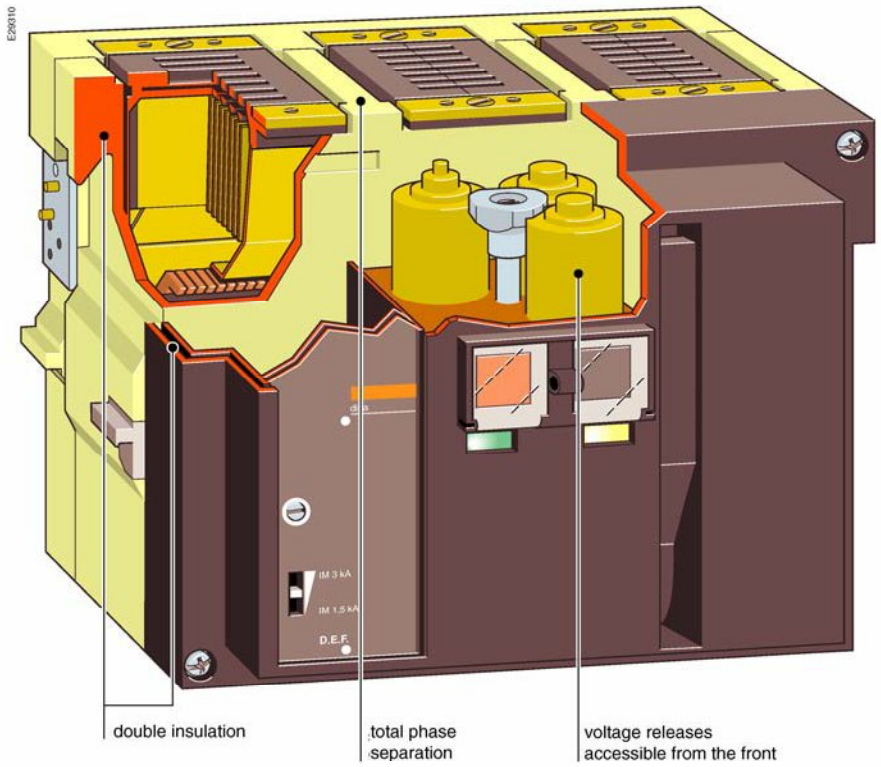
14 fault trip indicator/breaker reset button

Masterpact DC circuit breakers are available in fixed and drawout versions. They benefit from the AC range technology and advantages.
- 5 available ratings from 1000 to 8000 A;
- 2 breaking capacities, 100 kA at 500 V, 50 kA at 750 and 1000 V;
- a circuit-breaker version offering instantaneous short-circuit protection with an adjustable, magnetic trip unit (DINA);
- a switch (unprotected) version.

Auxiliaries
All the auxiliaries designed for the Masterpact AC circuit breakers may be used on the DC versions, with the exception of the position switches, indicating the connected (CE), disconnected (CD) and test (CT) positions.
Auxiliary connections are made via one or two manually disconnectable plugs that remain accessible from the front.

Accessories
Standard Masterpact DC range equipment includes an arc-chute cover (CC) and, on drawout versions, safety shutters (VO). Interphase barriers (EIP) are not available for the DC range.

MASTERPACT DC RANGE



safety and reliability

- reduced, simple maintenance (main contacts easily accessible, with wear indication feature);
- double insulation from the front face;
- positive contact indication;
- auxiliary devices can be fitted on site without adjustment;
- fewer parts than conventional ranges (by a factor of 5-10);
- a trip interlock ensures that the circuit breaker is open during connection and disconnection;
- connection to top or bottom terminals;
- fully tropicalised as standard.

stored energy operating mechanism

Masterpact circuit breakers are operated via a stored energy mechanism for instantaneous opening and closing.
The mechanism is charged either manually or electrically. Closing and opening operations can be initiated either from the local pushbuttons on the circuit breaker front face, or by remote control.

common auxiliaries from 1000 A to 8000 A

Auxiliaries

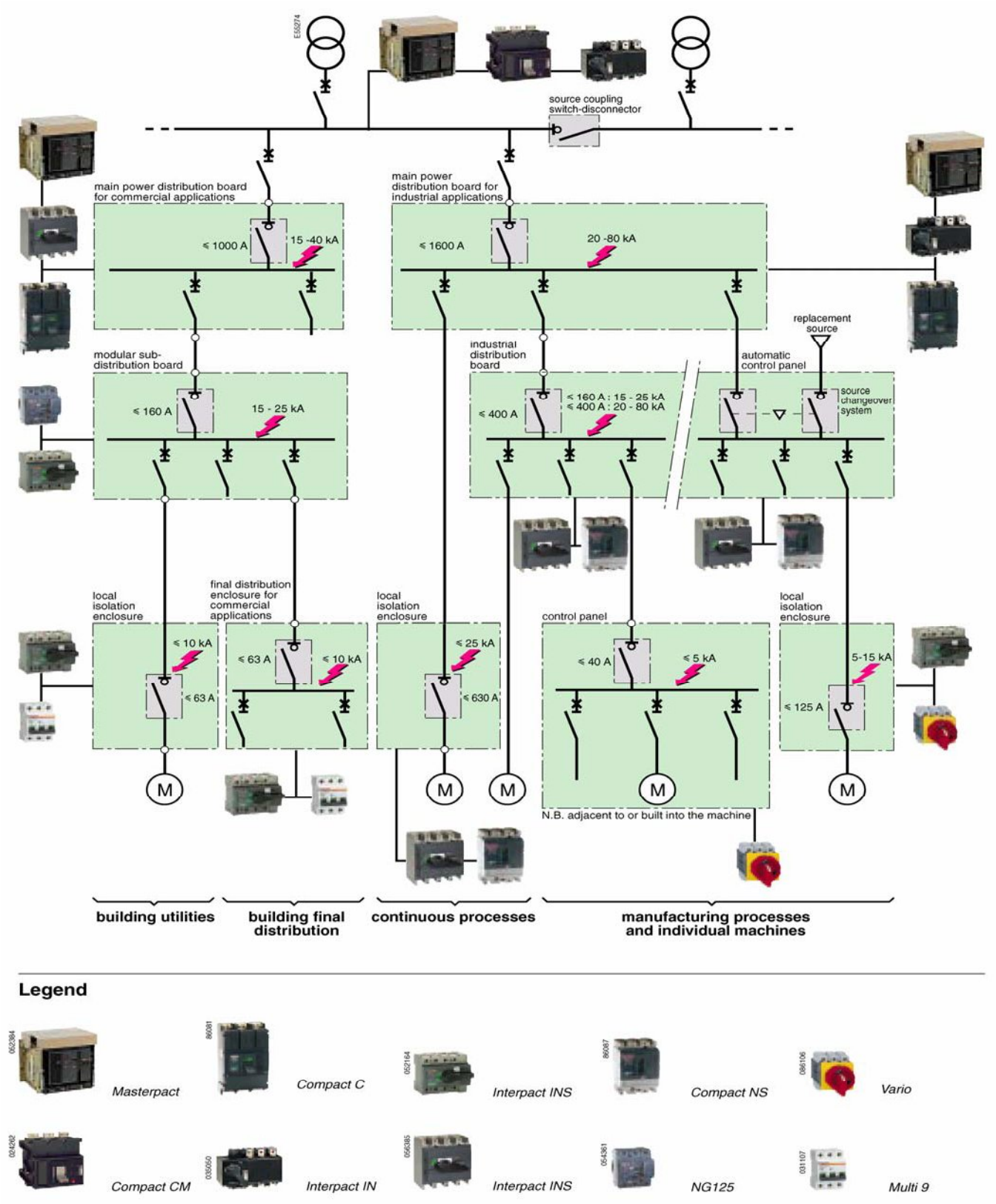
- accessible from the front, mounted in a separate compartment insulated from power circuits;
- secured by a single screw;
- adjustment-free;
- can be fitted on site.

device identification

M 20 DC

- **breaking capacity**
- **rating**
  - rated current/100.
- **family**
  - Masterpact: LV power air circuit breaker.

INTERPACT 40 to 2500 A



INTERPACT 40 to 2500 A

Masterbloc main power distribution board with Masterpact switch-disconnectors

Prisma sub-distribution board with Interpact switch-disconnectors

Pragma final distribution board with Interpact switch-disconnector

Source coupling switch-disconnector
- Merlin Gerin Masterpact, Compact CM and Interpact IN switch-disconnectors
- current ratings: up to 6300 A
- standards: IEC 60947-3, EN 60947-3
- catalogue: Masterpact, Compact CM, Interpact (see following pages).

Main power distribution boards for commercial and industrial applications
- Merlin Gerin Masterpact, Interpact INS/IN and Compact C switch-disconnectors
- current ratings: 400 to 1000 A for commercial applications and 400 to 1600 A for industrial applications
- standards: IEC 60947-3, EN 60947-3
- catalogue: Masterpact, Compact, Interpact (see following pages).

Industrial switchboards and automatic-control panels
- Merlin Gerin Interpact INS and Compact NS switch-disconnectors
- current ratings: up to 400 A
- standards: IEC 60947-3, EN 60947-3
- catalogue: Compact, Interpact (see following pages).

Sub-distribution boards for modular products
- Merlin Gerin Interpact INS and NG 125 switch-disconnectors
- current ratings: up to 160 A
- standards: IEC 60947-3, EN 60947-3
- catalogue: Multi 9, Interpact (see following pages).

Local isolation enclosures
- Merlin Gerin switch-disconnectors:
  - Interpact INS and Multi 9 (low ratings)
  - Interpact INS and Compact NS
- Telemecanique switch-disconnectors (12 to 175 A)
- current ratings: up to 63 A (low ratings), up to 630 A (industry)
- standards: IEC 60947-3, EN 60947-3
- catalogue: Compact, Interpact (see following pages), Telemecanique.

Small distribution enclosures for commercial applications
- Merlin Gerin Interpact INS and Multi 9 switch-disconnectors
- current ratings: up to 63 A
- standards: IEC 60947-3, EN 60947-3 or IEC 60669-1
- catalogue: Multi 9, Interpact (see following pages).

Control panels
- Telemecanique Vario switch-disconnectors
- current ratings: up to 60/80 A
- standards: IEC 60947-3, EN 60947-3
- catalogue: Telemecanique.

Local isolation enclosures (manufacturing processes and individual machines)
- Interpact INS and Telemecanique Vario switch-disconnectors
- current ratings: up to 63/80 A (Vario) and > 63/80 A (Interpact INS)
- standards: IEC 60947-3, EN 60947-3
- catalogue: Interpact (see following pages), Telemecanique.

INTERPACT 40 to 2500 A

- *circuit control and isolation*
- *industrial devices with modular profile from 40 to 160 A*
- *industrial devices from 100 to 2500 A for installation in functional and universal switchboards*
- *front or lateral handle are available on the same device (up to INS250)*

Interpact INS from 40 to 630 A

Interpact INS switch-disconnector from 40 to 80 A

Interpact INS switch-disconnector from 100 to 160 A

Interpact INS250 switch-disconnector

Interpact INS switch-disconnector from 400 to 630 A

Interpact IN from 1000 to 2500 A

Interpact IN1600 switch-disconnector

INTERPACT 40 to 2500 A

- circuit control and isolation
- additional functions for safety, remote control and convenience:
  - earth-fault protection
  - MN/MX auxiliary releases
  - motor mechanism
  - ammeter
  - source changeover
- homogeneity with respect to Compact circuit breakers in the same switchboard

Compact switch-disconnector

Compact switch-disconnector equipped with Vigi earth fault protection module

Compact switch-disconnector with motor-mechanism

MN/MX voltage release

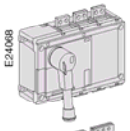
INTERPACT 40 to 2500 A

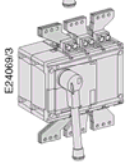
■ *circuit control and isolation*
■ *high making capacity and electrodynamic withstand*
■ *additional functions for safety and convenience:*
□ *MN/MX auxiliary releases*
□ *XF closing release*
□ *motor mechanism*
□ *source changeover*

Masterpact switch-disconnector

Complete device

Interpact IN1000 to IN2500



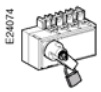


		3P	4P
Interpact IN1000	Fixed/FC	**47775**	**47751**
Interpact IN1600	Fixed/FC	**47776**	**47851**
Interpact IN2500	Fixed/FC	**47777**	**47855**

Accessories

Locks and interlocks

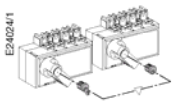
Handle locking


E24074

By 3 padlocks		built-in
By keylock (in OFF or ON position)		
1 keylock	Ronis 135.500	41940
	Profalux KS5B24D4Z	42888

ON position door interlock (for devices with extended rotary handles) — 47754

Key type interlock


E24024/1

2 keylocks / 1 key	Ronis 1351.500	41950
	Profalux KS5B24D4Z	42878

Spare parts

Black handle for direct rotary control


E24083

IN1000/IN1600	47759
IN2500	47862

Connection accessories (Cu or Al)

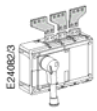
Terminal extensions for bars


E24080/1

Edgewise terminal extensions	IN1000 (per pole)	47758
	IN1600 (per pole)	47858

Spreaders (for upstream or downstream connection)


E24081


E24082/3

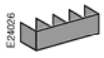
IN1000	set of 3	47760
	set of 4	47761
IN1600	set of 3	47760
	set of 4	47761
IN2500		1 set supplied

Connectors


E24034

IN2500 (1 connector)	55675

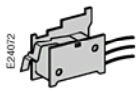
Phase barriers


E24026

IN1000/IN1600	3P/4P	47756
IN2500	3P/4P	47860

Electrical auxiliaries

Auxiliary contacts


E24012

1 OF or CAM (depending on how it is mounted)	42906
2 OF contacts	47757

Rotary handles

Accessories for conversion to extended rotary handle (short shaft)


E23846

Front handle	47753

Management of electrical installations: cost-effectiveness in industrial and commercial buildings

In the past, electricity was viewed simply as a necessity associated with an unavoidable cost. Today, energy management and the control of electrical installations are increasingly a part of business cost-effectiveness goals involving:
- *continuity of service;*
- *optimisation of resources and maintenance;*
- *power quality;*
- *building security.*

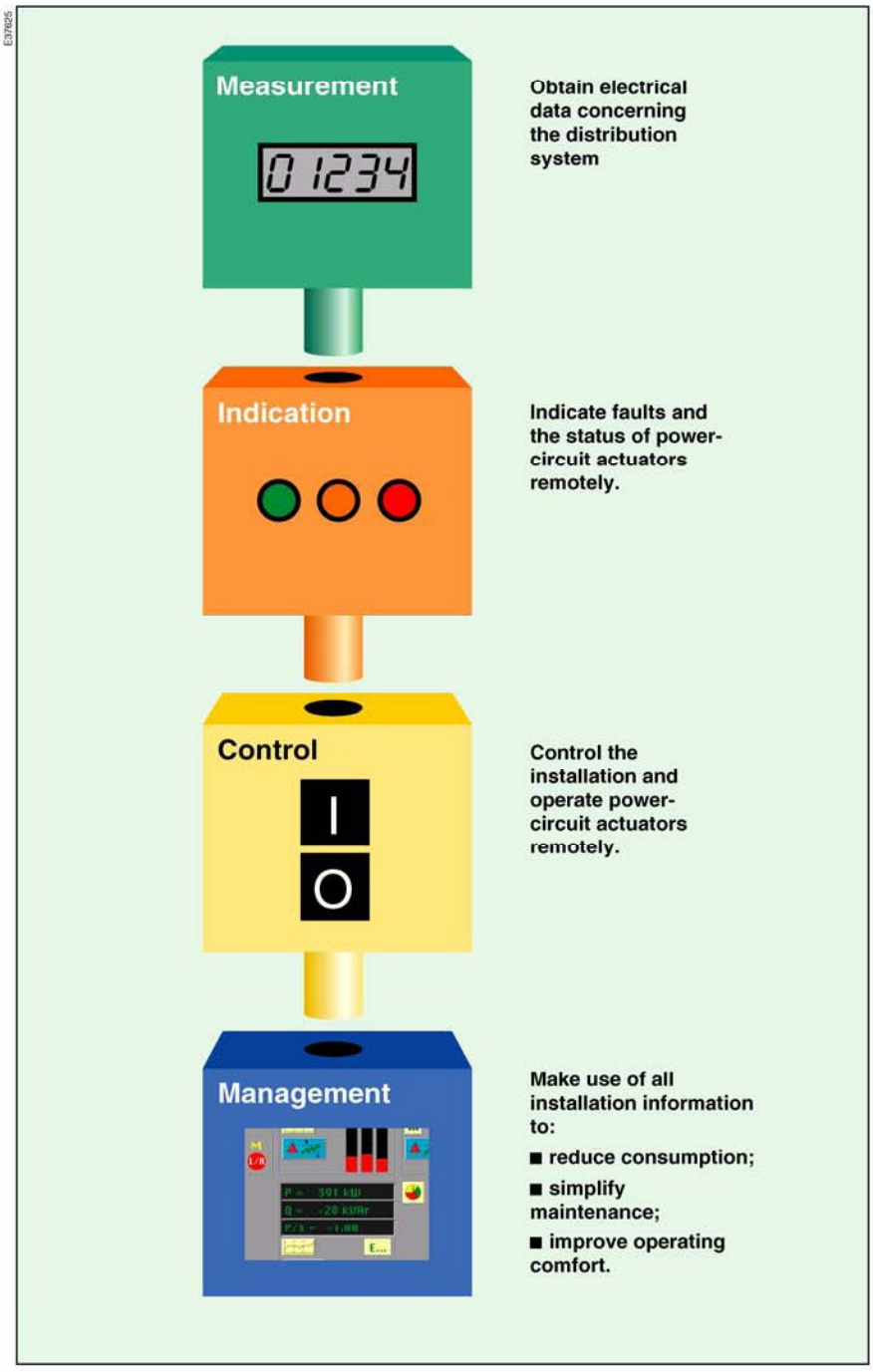
Mastering electrical power: a priority.

An electrical installation must be operated with the following objectives in mind:
- improved power availability;
- reduced electricity bills;
- savings on installation, maintenance and upgrading costs;
- guaranteed operator safety;
- greater operating comfort.

Until now, this was only possible for the largest installations. With the Digipact Merlin Gerin range, Schneider proposes a new approach to the management of electrical installations that is scalable, upgradable, and suitable for all installation configurations.

To achieve the above objectives, the operator must:
- implement installation control functions, know the status of all power-circuit actuators and control them remotely;
- communicate with the various components of the installation to ensure a fast reaction when a problem occurs;
- use the communicated information to manage consumption, analyse costs and charge them to each department or production line;
- measure the electrical parameters of the distribution system (voltage, current, power, etc.);
- protect personnel and equipment.

The Digipact Merlin Gerin solution: easy access to installation management



The modular design of the Digipact system means it can adapt easily to all operator needs.

Flexibility and upgradability

The Digipact system offers the operator an answer tailored to his immediate need and ready for future modifications in the installation and management system. Digipact is designed for easy addition of new functions.

A wide range of functions

■ Measurement of electrical parameters:
□ voltmeter and ammeter on the front panel of the switchboard,
□ power meters combining a number of devices in a single unit, with the possibility of transmitting the measurements to a central PC.

■ Control of the electrical installation:
□ centralisation of electrical data for checking and analysis,
□ remote control of circuit breakers and other power-circuit actuators,
□ display of installation single-line diagram, status of devices, presence of voltage on the busbars,
□ detection of problems and alarms,
□ scheduling.

■ Diagnostics and maintenance assistance:
□ fault locating,
□ historical data and event logging.

■ Optimised energy management:
□ monitoring of power and energy consumption, both active and reactive,
□ analytical cost attribution,
□ remote reading of energy meters.

From local or centralised measurement of electrical parameters...

First role of the Digipact system: measurement of electrical parameters.

High-performance measurement devices
The Digipact measurement system is made up of:
■ digital voltmeters;
■ digital ammeters;
■ power meters:
□ combining a number of devices (voltmeter, ammeter, wattmeter, watthour meter, etc.) in a single product;
□ true rms current measurements up to the 31st harmonic;
□ power quality measurements (harmonic distortion);
□ communications functions to replace manual readings and use the measurements effectively.

Digipact UM100 digital voltmeter

Digipact IM100 digital ammeter


Digipact PM100 power meter on the front panel of a switchboard. Measures voltage, current, power, energy, harmonic distortion.

Reduced dimensions and wiring for greater reliability at a lower cost

A single Digipact power meter may be used to replace a number of other devices, such as voltmeters, ammeters, wattmeters, watthour meters, etc. The result is:
■ more space available in switchboards;
■ assembly and wiring savings;
■ greater reliability.

Digipact power meters communicate...

■ via the Digipact internal bus (PM150) for integration in a system comprising communicating devices;
■ via MODBUS/JBUS (PM300) for dialogue with equipment at a higher level.

All data available on the front panel of the switchboard may be transmitted to a personal computer (PC) or a programmable logic controller (PLC).

PM300 communicating power meter.

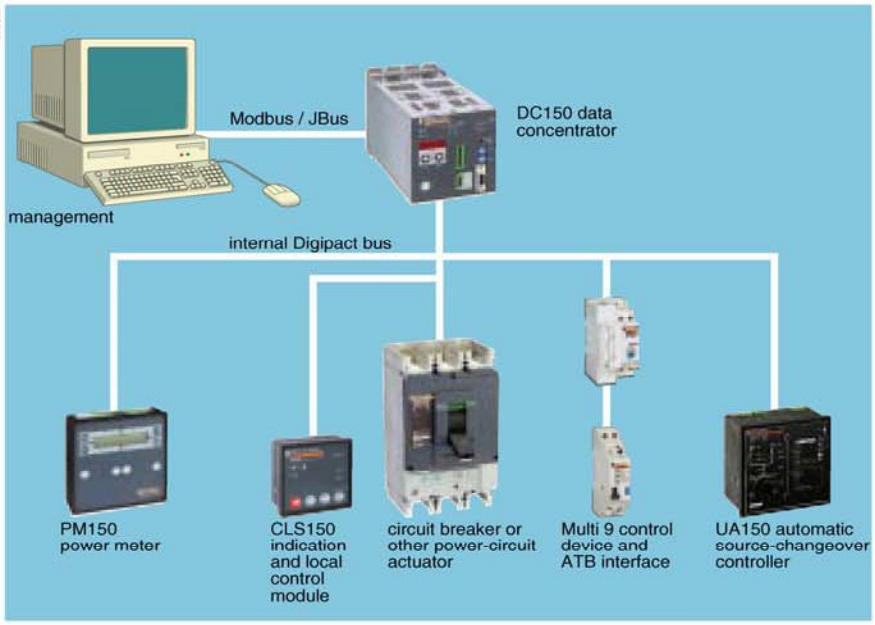
...for easy and effective use of measurements

Transmission of measurement data to a supervisor eliminates manual meter reading. In addition, all information arriving from the power meter can be used immediately for:
■ sub-metering;
■ power consumption readings at each point in the installation (for charging to each department or production line, etc.);
■ power consumption history.

An upgradable measurement system

The Digipact measurement system is upgradable. It can be used initially on the front panel of the switchboard and subsequently connected to a supervisor.

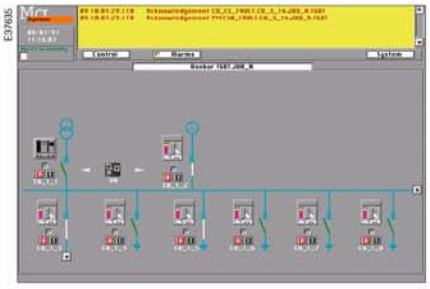
... on up to a complete control and monitoring system - the easy way.



Additional role of the Digipact system: an electrical installation control and monitoring system, based on communicating power meters, communicating low-voltage devices and supervision software.

Digivision software

- Centralisation of all measurement, history and trend data.
- Control of circuit breakers from the supervisor.
- Display and continuous updating of the installation single-line diagram: display of the status of each circuit breaker and source changeover system.
- Alarm function following tripping of a circuit breaker or on reception of a given value of an electrical parameter.
- Maintenance information: number of operating cycles, cause of tripping, settings, through-current.
- Power consumption monitoring curves.
- Scheduling functions for operation of outgoing circuits.



Digipact communicating low-voltage devices - a comprehensive offering

The Compact and Masterpact ranges of circuit breakers incorporate or may be equipped with communications modules. From a remote location, the operator can:
- display the status of circuit breakers;
- control the circuit breakers;
- access information provided by the electronic control units.

It is also possible to check the status of the UA150 automatic source-changeover controllers.

Installation management

Using a standard personal computer (PC) or programmable logic controller (PLC), the operator can:
- analyse the information received from the power meters;
- remotely control the Compact and Masterpact circuit breakers or other power-circuit actuators;
- display the status of devices and their settings;
- communicate with the UA150 automatic source-changeover controllers.

Digipact modularity extended to the entire installation

Products from the Digipact range may be used to implement the data received from:
- Sepam medium-voltage relays;
- the Vigilohm System (insulation monitoring for IT systems);
- Masterpact circuit breakers equipped with an STR68 control unit.

Digivision supervision software

Digivision is installed on a standard personal computer. It processes all the information supplied by the Digipact system (installation status, power consumption curves, scheduling function for the outgoing circuits, etc.). Digivision adds the final touch to the Digipact range, letting the operator manage the entire electrical installation... The easy way!

Digipact - the advantages of a large system now available for all industrial and commercial buildings

The Digipact Merlin Gerin electrical installation management system meets the needs of all those involved in the electrical sector.

The answer to all requirements

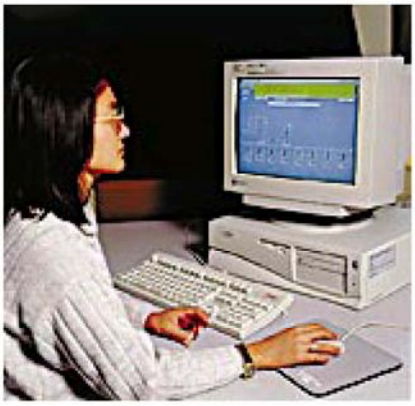
Digipact was designed to meet three essential needs:
- ease of selection, implementation, installation and operation;
- savings on installation design, capital investment, implementation and operating costs;
- safety and reliability of an electrical installation management system designed for use in conjunction with the protective devices.

Design office: ease of design, upgradability and high performance.

Inspection organisation: operating safety and simplicity of settings.

Distributor: simplified offering and fewer catalogue numbers.

Panel-builder/installer: space savings, less wiring and easy implementation.

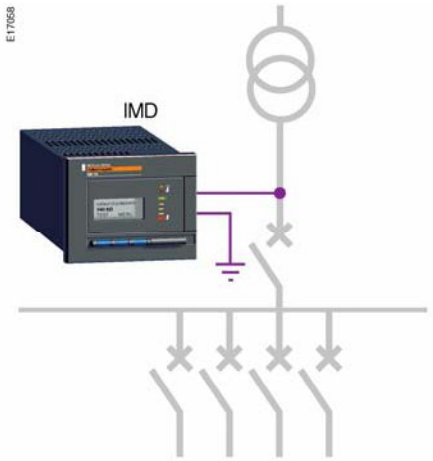


Operator: flexible system, simplified operation, electricity savings and maintenance aids.

1.e. CONTINUOUS INSULATION MONITORING

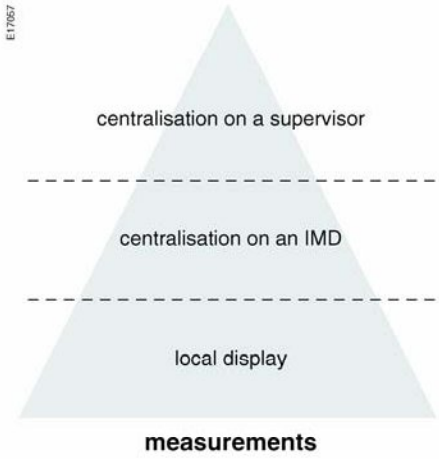
principle

Insulation monitoring is provided on IT systems to detect and indicate insulation faults as soon as they occur.
The basic function is carried out by an Insulation Monitoring Device (IMD), also referred to in certain documentation as a permanent or continuous insulation monitor (PIM or CIM respectively). The monitoring device injects a DC or low-frequency AC voltage between the installation and earth. The insulation resistance is determined from the resulting current. This technique can be used on all types of installations: AC, DC, rectified, mixed AC/DC, etc.



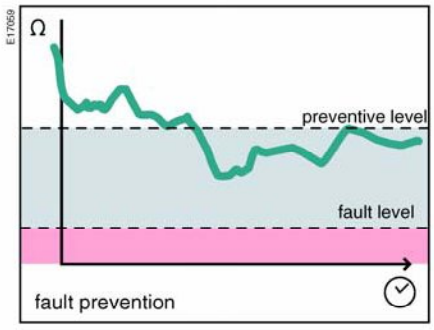
communication features

In addition to displaying the insulation values it measures for the installation as a whole, an insulation monitoring device can also provide a **centralised display** for information concerning specific circuits. It receives this information from communicating insulation fault locators and detectors distributed throughout the installation. All this information may also be transmitted to a **remote supervisory system.**
These communication features satisfy the operating requirements of modern electrical installations. All information concerning the insulation can be transmitted via a communication bus for display on a centralised insulation monitoring device or to a supervision system for centralised processing and management.



prevention of insulation faults

Prevention is the best way to ensure the continuity of supply of electrical installations. It may be applied in two ways:
- the insulation monitoring device signals a drop in the insulation resistance below a non-critical prevention threshold determined by the user;
- the measurements are transmitted to a supervisor, which can then process them to predict insulation faults on ageing cables. These indications can be used to schedule preventive maintenance.



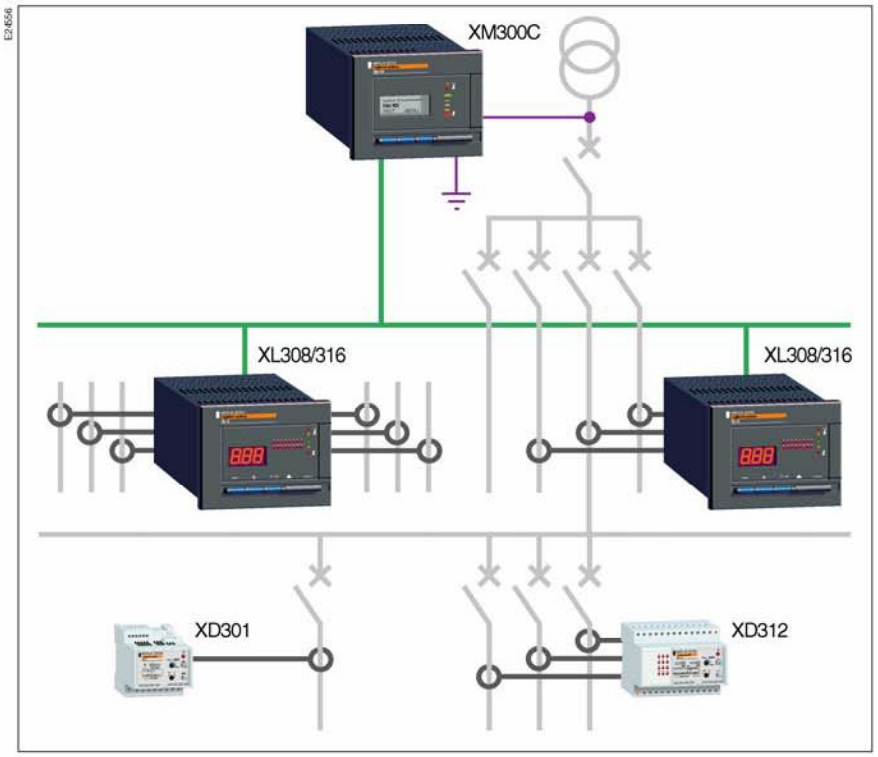
fault locating

Insulation monitoring can be coupled with a fault locating system.
The devices of the Vigilohm range and the Vigilohm system offer two ways of locating faults. The first is automatic and the second manual.

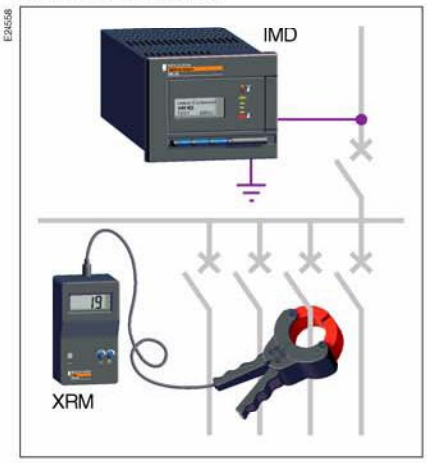
Automatic fault locating
The faulty circuit is located automatically, without any human intervention. A detection or locating device (XD301/XD312/XD308C, XL308/XL316, XML308/XML316) is connected to toroids installed on the various circuits. It automatically identifies the faulty circuit by capturing the low-frequency fault locating signal emitted by the insulation monitoring device.
In addition, the XL308/XL316 and XML308/XML316 locating devices measure the insulation resistance of each circuit.

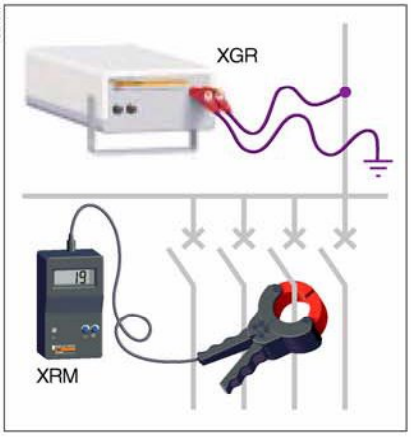
Manual fault locating
The fault is located by testing different points in the installation, one after another, using a Vigilohm System XRM mobile receiver and a current probe. The receiver captures the low-frequency fault locating signal.
Two cases may be encountered:
■ the installation is equipped with an XM200 or XM300C insulation monitoring device (Vigilohm System).
In this case, the manual system is used to fine-tune the results of the automatic locating system
■ the installation (relatively small or an isolated sub-system) is equipped with an insulation monitoring device for DC applications. In this case, a Vigilohm XGR portable generator is used together with an XRM receiver.

Automatic fault locating



Manual fault locating





the power of a communicating system

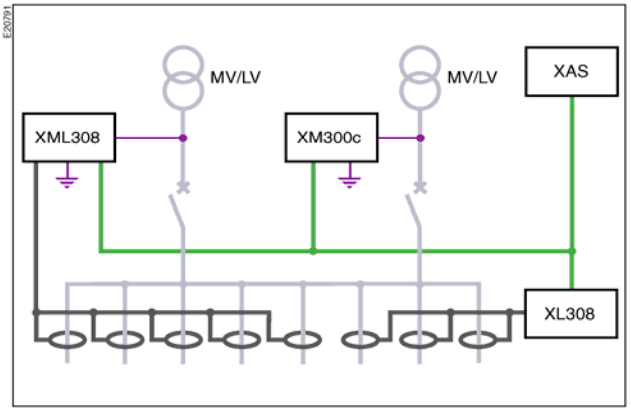
The power of the Vigilohm System lies in the capacity it offers for communication between all its devices, thereby ensuring insulation monitoring and complementary functions such as automatic locating of faults or the anticipation of their occurrence.
In addition, the Vigilohm System is capable of communicating with a supervisor or a PLC, i.e. it can both transmit data to and receive data from such units.
The transfer of information takes place:
■ via the internal Vigilohm System bus for communication between the devices;
■ via the external Vigilohm System bus for communication with a supervisor or PLC.
In both cases, the use of an internal or external bus requires a communication interface.

four interfaces

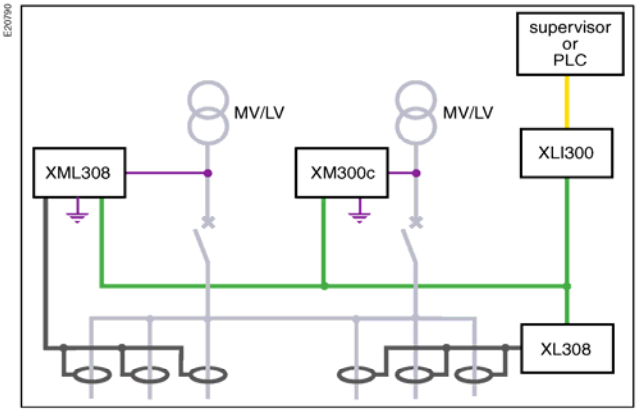
The Vigilohm System offers four interfaces:
■ **the XLI200 interface**, for the transmission of information from the insulation monitoring device and XD308C detectors to a supervisor or PLC via MODBUS/JBUS.
In this way, a PC can access information concerning the presence of faults and the identification of the faulty circuit. This interface cannot be used with XL308/316 or XML308/316 devices and connects only to the XM300C and XD308C (the XLI200 cannot be used with XML monitoring-locating devices or with XL locating devices).
■ **the XLI300 interface**, for the transmission of measurements and measurement parameters from the XM300C and XD308C devices to a supervisor. This interface is used on single busbar installations. The exclusion of other insulation monitoring devices found on the same installation is managed automatically;
■ **the XTU300 interface**, for communication between the Vigilohm System and a supervisor, like the XLI300 interface. This interface is required for installations with multiple busbars and bus coupler circuit breakers. It manages the exclusion of other insulation monitoring devices found on the same installation and the link between the locators and their corresponding insulation monitoring devices;
■ **the XAS interface**, indispensable for the operation of the communication bus in the absence of one of the two other interfaces.

interface selection table

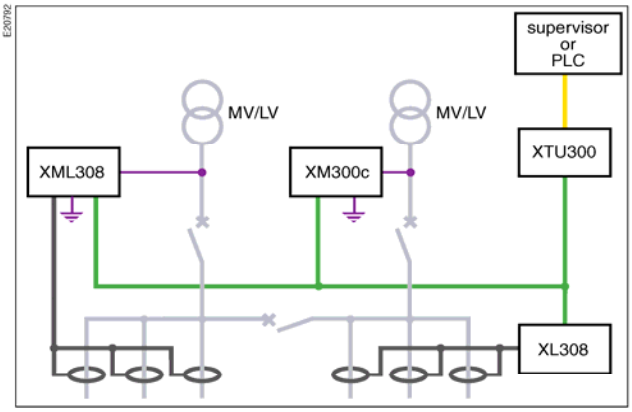
	IMD associated only with XD308C communicating detectors, whatever the installation configuration	one XML308/316 device	IMD with at least 2 locators + 1 set of busbars	IMD with a least 2 locators + several sets of busbars
without supervision	----	----	XAS	XTU300
with supervision	XLI200	XLI300	XLI300	XTU300



One set of busbars without supervisor

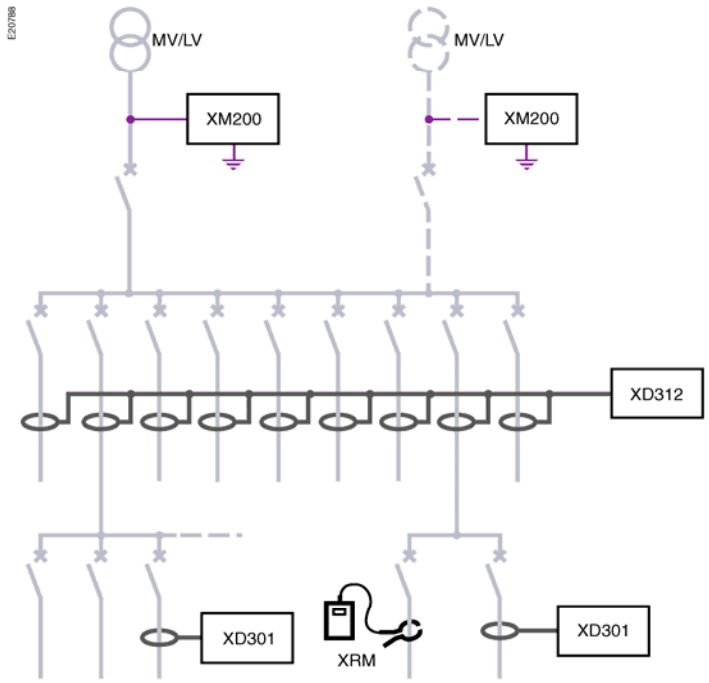


One set of busbars with supervisor



Several sets of busbars with bus coupling and with or without supervisor

application of the measurement voltage
internal Vigilohm System bus
JBUS bus



automatic fault locating with or without supervision

The following examples cover two typical installation configurations with insulation monitoring and fault locating systems.

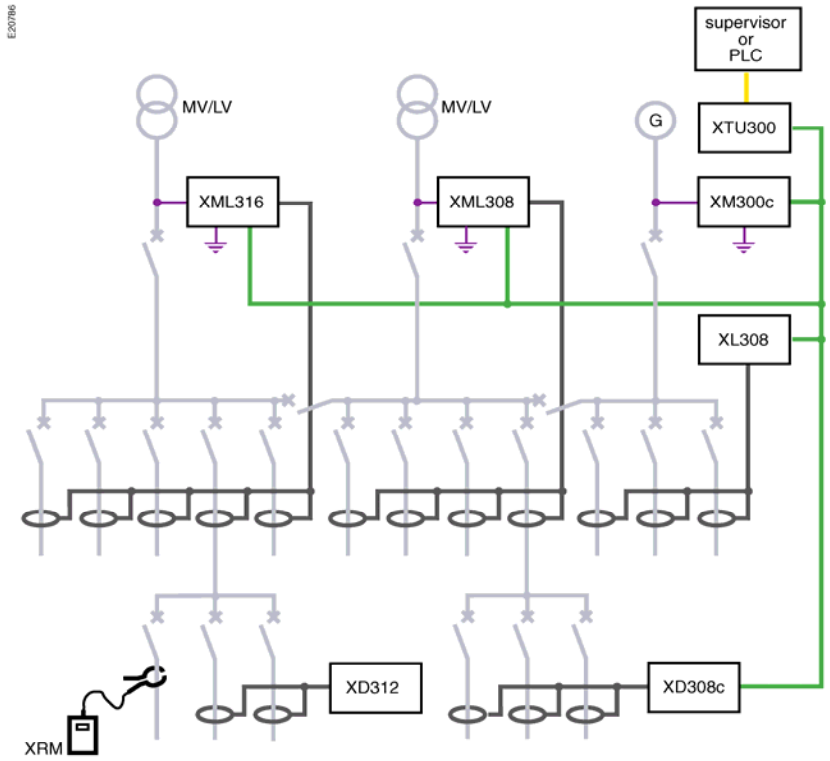
Example 1:

■ automatic fault locating with local display.

The use of an XM200 insulation monitoring device together with XD301 and XD312 detectors represents the typical case providing basic detection and automatic locating of insulation faults on the main feeders as well as on certain secondary feeders.

Fault locating can be fine-tuned using an XRM mobile receiver and a current probe to determine the exact location of the fault on the faulty circuit.

The auto-exclusion of other XM200 insulation monitoring devices is controlled by the circuit breaker position indication contacts.



Example 2:

■ measurement and automatic fault locating with local and centralised display, for an installation with more than one set of busbars and a bus coupling circuit breaker.

The measurement of the insulation resistance on the main feeders is provided in addition to fault detection with automatic locating (XL308/316 and XML308/316).

The secondary feeders are monitored simply by an XD312/301 detector or by an XD308C detector that communicates detected faults to the supervisor (via the XTU300 interface).

The architecture of the installation (several sources and sets of busbars) makes it necessary to use an XTU300 interface to handle the exclusion of other insulation monitoring devices and the link between the locators and their corresponding insulation monitoring devices.

application of the measurement voltage
internal Vigilohm System bus
JBUS bus

easier operation of IT systems

An installation implementing the IT system, i.e. isolated from earth or connected to earth through a sufficiently high impedance, gives top priority to continuity of supply.
Today, the operation of such installations can be greatly facilitated by the use of devices that offer functions going far beyond the simple fault signalling imposed by standards.

... with Vigilohm System

Vigilohm System is a range of Merlin Gerin products meeting the needs of IT systems in terms of performance, practical operation and continuity of supply.
This range features modular design. It is made up of Insulation Monitoring Devices (IMDs) and fault detection and locating devices. Some of these devices make independent measurements of the insulation resistance on each circuit.
In addition, the Vigilohm System can communicate with a supervisor or PLC.

principle and functions

The basic device is the **Insulation Monitoring Device** (IMD). It injects a low-frequency AC voltage between earth and the installation. Based on a measurement of the resulting current, the Vigilohm System accurately determines the true insulation resistance of the installation and its earth leakage capacitance. This technique can be used on all types of installations: AC, DC, rectified, mixed, etc.

Fault locating is the main function associated with insulation monitoring. Toroids placed on the various circuits capture a signal proportional to the current injected by the insulation monitoring device. This signal is transmitted to fault detection and locating devices which automatically identify any faulty circuit.

Distributed measurements of the insulation resistance and the earth leakage capacitance are possible on each circuit via the toroids used for fault locating.

Centralisation on a supervisor. Via a communication bus using JBUS protocol, the Vigilohm System can forward all measurements, information and events to a supervisor. In this way, the supervisor maintains full knowledge on the insulation status of the overall installation and the individually monitored circuits. The supervisor (or PLC) can be connected to a printer to log all events occurring on the installation, complete with location and timestamp.

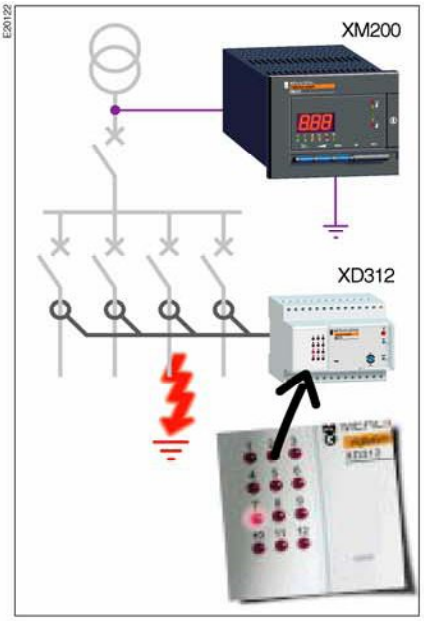
Adaptation to variable installation configurations. The system automatically excludes all but one insulation monitoring device connected to the same set of busbars.

Other functions
- measurement of the true insulation resistance
- measurement of the earth leakage capacitance
- indication of transient faults
- prevention alarm when the insulation resistance falls below a non-critical threshold determined by the user;
- remote interrogation and display, from the insulation monitoring device, of faults detected by the fault locators
- setting of alarm thresholds from a supervisor
- ...

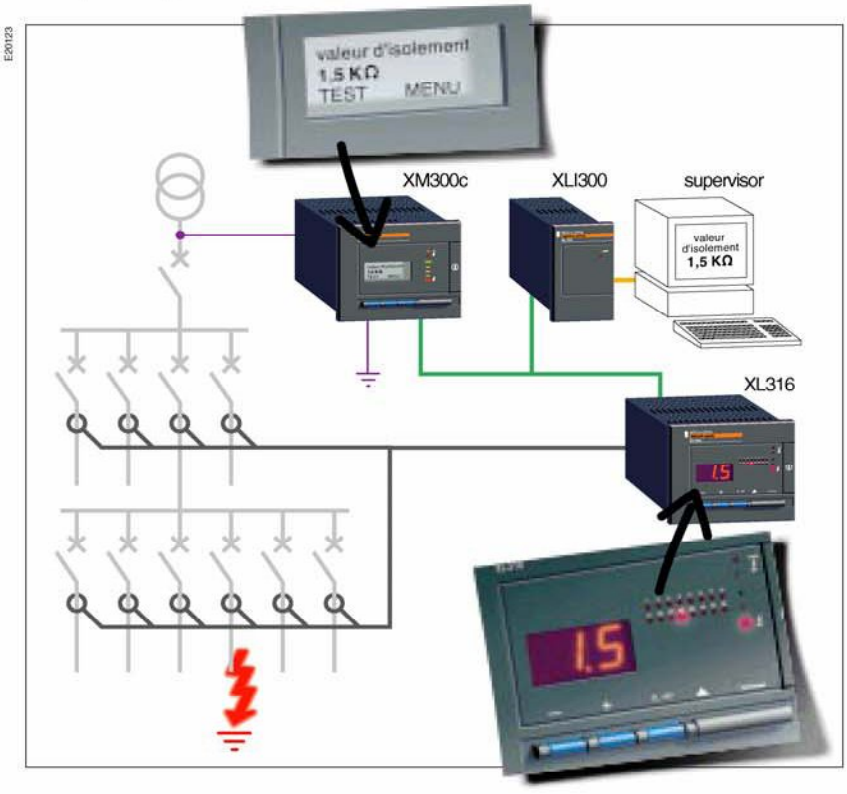
The system evolves with the needs of the installation. New devices can be added at any time to adapt to installation modifications or provide higher levels of monitoring.

insensitivity to electrical disturbances

The Vigilohm System offers both measurement accuracy and insensitivity to electrical disturbances. Designed to operate on modern installations, it is not affected by the harmonics generated by loads such as variable speed drives, UPSs and switch-mode power supplies.



From automatic fault locating with local display ...



... to distributed measurements with centralised display

Vigilohm System without a communication bus

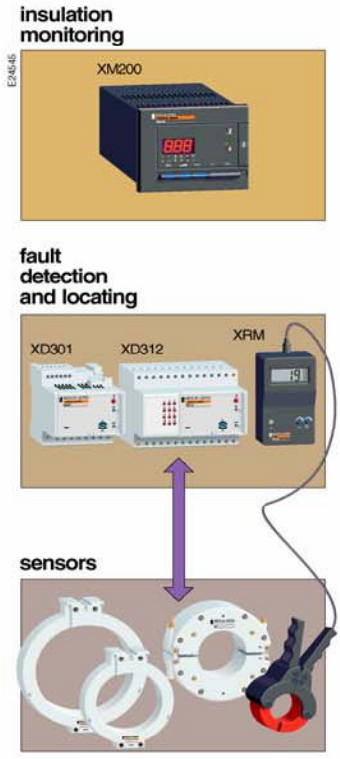
This architecture can be used to obtain automatic fault locating and accurate overall insulation measurements on all types of installations.

Vigilohm System with a communication bus

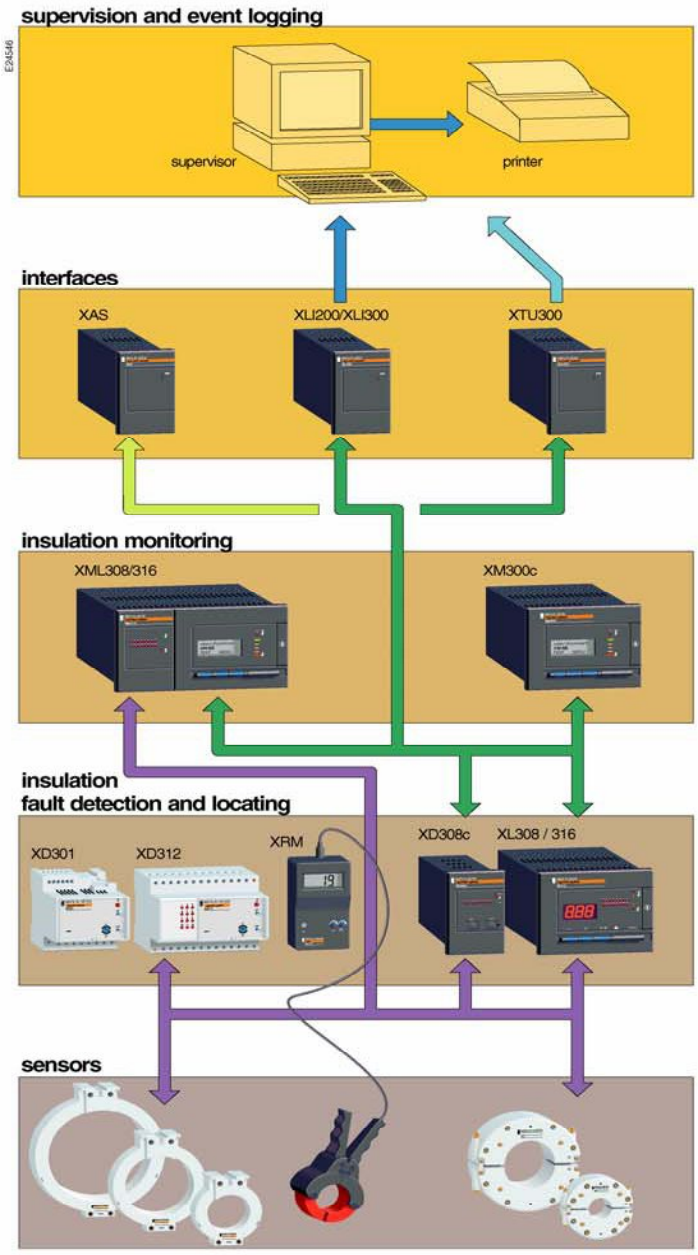
The communication bus adds the following possibilities:
- communication with a supervisor (transmission of measurements and reception of settings)
- measure the insulation resistance and earth leakage capacitance of each circuit
- centralisation of the locator measurements on the insulation monitoring device displays.

The illustrations below show the two architectures and the devices they include.

Vigilohm System without a communication bus



Vigilohm System with a communication bus



what devices make up the system?

■ XM200 and XM300C insulation monitoring devices inject a signal that is used by the detection and locating devices;
■ XL308 and XL316 locators, connected to 8 or 16 toroids, measure the insulation resistance of each circuit (distributed measurements) and, in the event of a fault, automatically identify the faulty circuit. They can transmit this information to a supervisor;
■ XML308 and XML316 monitoring-locating devices combine the monitoring and locating functions in a single unit;
■ the XD308C communicating insulation fault detector automatically identifies the faulty circuit and transmits this information to a supervisor;
■ XD301 and XD312 non-communicating insulation fault detectors automatically identify the faulty circuit;
■ the XRM mobile receiver can be used to fine-tune the automatic locating results by identifying the faulty circuit at the final distribution level;
■ XAS, XLI200, XLI300 and XTU300 interfaces make communication possible between the Vigilohm System and a supervisor.

how to choose the right system?

The right system can be chosen in four steps, described in detail below:
1. define the required level of locating and measurement performance.
2. select the corresponding locating and measurement devices.
3. select the insulation monitoring devices compatible with the locating and measurement devices.
4. check whether or not an interface is required.

Note: connect the insulation monitoring device to a PHT1000 subassembly if the installation voltage U is:
■ 760 < U < 1700 V AC (neutral distributed);
■ 440 < U < 1000 V AC (neutral not distributed);
■ 550 < U < 1200 V DC (DC or rectified voltage).

① level of locating and measurement performance

According to your need, select one of the five possibilities listed in part 1 of the table. The choice depends on:
■ the required performance of the locating system to be associated with the fault detection function;
■ the need for independent insulation measurements on each circuit.
The five possibilities are (in increasing order of performance):

□ manual fault locating
the fault is located using a mobile receiver connected to a current probe placed at different points in the installation one after another. This type of system is recommended as an enhancement to the automatic system in order to determine the faulty portion of a circuit on which an insulation fault has been detected.

□ automatic fault locating with local display
the faulty circuit is identified and indicated on the front face of the fault detector.
A contact is provided for remote indications,

□ automatic fault locating with centralised display
the faulty circuit is identified and indicated on the front face of the fault detector. The information is also transmitted to a supervisor or a PLC,

□ distributed measurements with local display
the devices measure the insulation resistance on each circuit independently. These measurements can be read on the front face of the device.
Faults are located and displayed locally. A contact is provided for remote indications,

□ distributed measurements with centralised display
the insulation measurement for each circuit and the indication of the faulty circuit are displayed on the front of the device and transmitted to a supervisor or PLC.

② selection of the locating and measurement devices

On the line selected in part **1**, select the fault locating or distributed measurement device in part **2** of the table.

③ selection of the insulation monitoring device

Similarly, determine the insulation monitoring devices, in part **3** of the table, that are compatible with the selected locating and measurement devices.

④ necessity of an interface

For the column selected in part **2** of the table, part **4** indicates whether or not an interface is required. If required, the interface will be selected according to the installation and the devices making up the system. See the page entitled "choosing the communication interface".

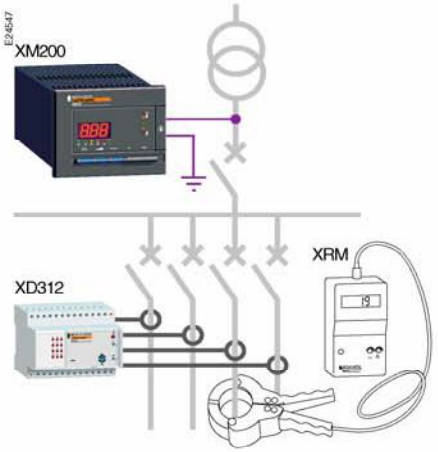
	② locating and measurement devices			
	XRM receiver	XD301/302 detector	XD308C detector	XL308/316 locator
① level of performance				
manual fault locating	■			
automatic fault locating with local display		■	□	□
automatic fault locating with centralised display			■	□
distributed measurements with local display				■
distributed measurements with centralised display				■
③ insulation monitoring device				
XM200	■	■		
XM300c	□	□	■	■
XML308/316	□	□	□	■
④ XAS, XLI200, XLI300, XTU300 interfaces			■	■

■ device providing only the required function
□ device offering additional possibilities or higher performance.

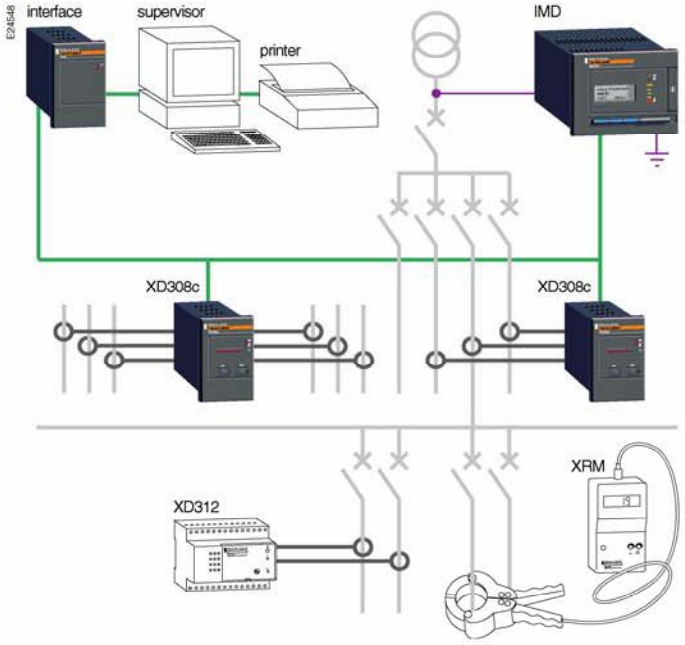
CONTINUOUS INSULATION MONITORING

The Vigilohm System offers four fault locating performance levels.
level 1: automatic fault detection and locating.
level 2: automatic fault detection and locating with transmission to a supervisor.
level 3: automatic fault detection, locating and measurement.
level 4: automatic fault detection, locating and measurement with transmission to a supervisor.

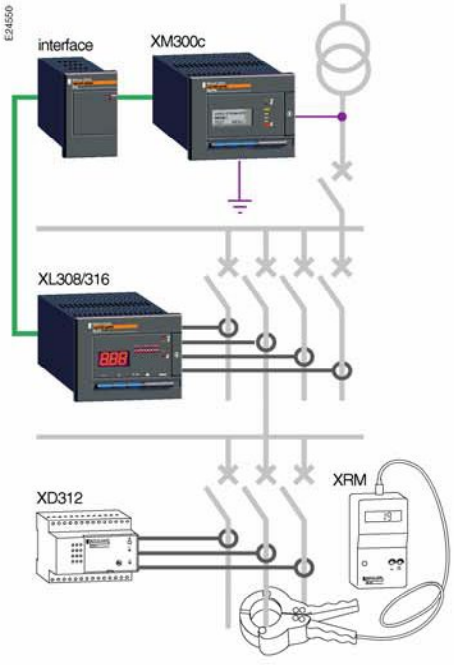
Manual fault locating with the XRM mobile receiver is generally used to fine-tune the automatic locating results.



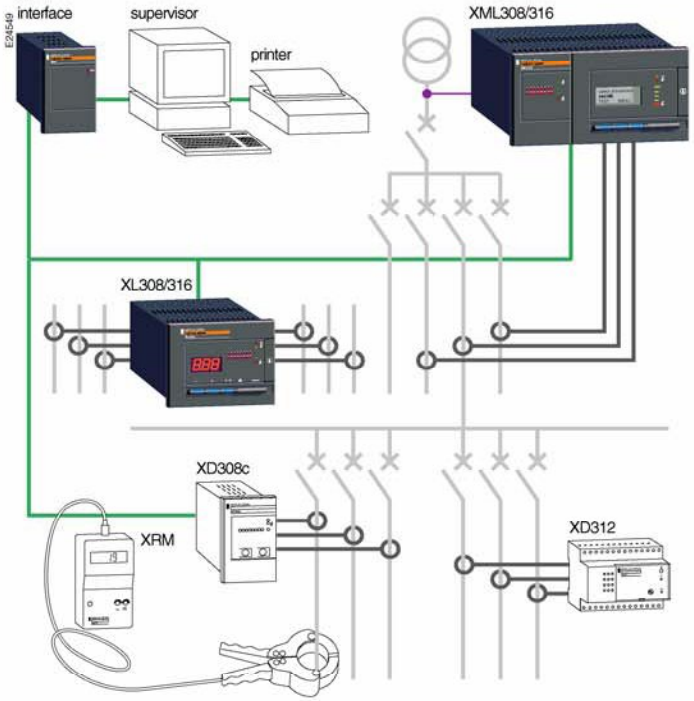
level 1: automatic fault detection and locating



level 2: automatic fault detection and locating with transmission to a supervisor.



level 3: automatic fault detection, locating and measurement



level 4: automatic fault detection, locating and measurement with trnsmission to a supervisor.